

Historic, archived document

Do not assume content reflects current
scientific knowledge, policies, or
practices.

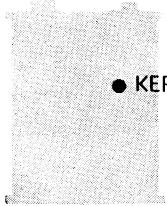
Fig 784F
p. 2

Farmers' Bulletin No. 2156

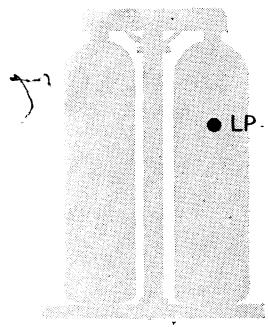


● GASOLINE

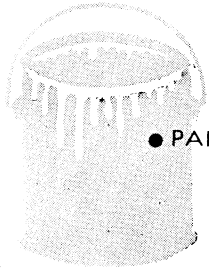
U. S. DEPT. OF AGRICULTURE
LIBRARY
MAR 30 1961
CURRENT SERIAL RECORDS



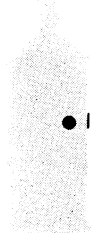
● KEROSENE



● LP-GAS



● PAINTS



● INSECTICIDES

Safe Use and Storage of FLAMMABLE LIQUIDS and GASES on the Farm

CONTENTS

	Page
SAFE USE	3
Dry cleaning.....	3
Gasoline engines.....	3
Gasoline stoves, lamps, and blowtorches.....	5
Pouring gasoline.....	5
Kerosene lanterns, heaters, incubators, and brooders.....	6
Starting or reviving fires with kerosene.....	7
Fuel-oil burners.....	7
LP gas.....	8
Spraying insecticides.....	9
Paints and lacquers.....	10
STORAGE	11
Gasoline.....	11
Kerosene.....	13
Diesel fuel.....	13
LP gas.....	13
EXTINGUISHING SMALL FIRES	13
Flammable-liquid fires.....	13
LP-gas fires.....	16



Growth Through Agricultural Progress

This bulletin supersedes Farmers' Bulletin 1678, "Safe Use and Storage of Gasoline and Kerosene on the Farm."

Washington, D.C.

Issued February 1961

Safe Use and Storage of FLAMMABLE LIQUIDS and GASES on the Farm

By Merrill S. Timmins, Jr.,
Agricultural Engineering Research Division,
Agricultural Research Service

Gasoline, kerosene, LP gas, and other petroleum products are dangerous. Careless use or improper storage of these flammable liquids and gases can result in a serious fire or explosion.

Every year, hundreds of persons die in such fires and explosions on farms; many more suffer serious injury; millions of dollars' worth of property is damaged or destroyed.

You can greatly reduce the possibility of fire or explosion when using or storing flammable liquids or gases by observing proper precautions. You can further safeguard life and property by maintaining suitable fire-fighting equipment on your farm.

SAFE USE

Dry Cleaning

Dry cleaning in the home is dangerous and should be avoided if possible. However, if it must be done, a nonflammable cleaning fluid, such as carbon tetrachloride, should be used.

Gasoline, naphtha, and benzene

should never be used for dry cleaning. They are too highly flammable. During cleaning operations, they will give off vapors that may form an explosive mixture with the air. Any spark or flame could ignite this mixture and cause an explosion.

Carbon tetrachloride and most other cleaning solvents produce vapors that are dangerous to breathe in any quantity. Use them only in a well-ventilated room or preferably outdoors. Keep the quantity of liquid used at the minimum.

There are many dry-cleaning solvents on the market under a variety of trade names. Most, if not all, will produce flammable fumes and must be used carefully. When possible, do the dry cleaning outdoors and hang the garments outdoors to dry. If the garments are hung indoors, flammable fumes may accumulate.

Gasoline Engines

FIRE HAZARD.—Do not house or operate automobiles, trucks, tractors, or stationary engines in barns



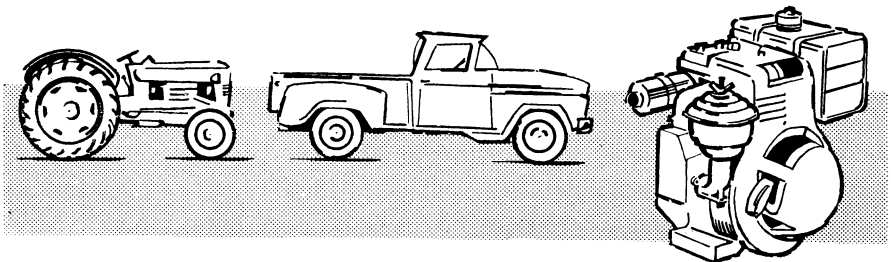
or granaries. These buildings usually contain combustible material and explosive mixtures of gases or dust. An engine may backfire when it is started, and a fire could occur. During operation of an engine, a fire could be started by an overheated or faulty muffler, hot or burning carbon deposits, or faulty ignition.

CLEANING ENGINES.—Do not use gasoline to clean automobiles, trucks, tractors, stationary engines, or other machine parts. The vapors produced during the cleaning process may form an explosive mixture

with the air. The mixture could be ignited by an open flame, lighted cigarette, static electricity, or a spark caused by striking two pieces of metal together.

Use a commercial solvent, such as Varsol, Varnolene, or Gunk,¹ to loosen grease. Remove dirt and grease with steam or hot water. Wipe dry.

¹Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guaranty or warranty of the product named and does not signify that this product is approved to the exclusion of other comparable products.



Gasoline Stoves, Lamps, and Blowtorches

The use of gasoline stoves, lamps, and blowtorches may require handling gasoline in or around buildings. An accident resulting in spilling of gasoline could lead to a disastrous fire. The equipment must be handled with special care, and precautions should be closely observed.

STOVES.—Do not keep a gasoline reservoir of more than 1-gallon capacity inside a building. Install larger reservoirs outside buildings. Supply fuel to the stove by means of metallic piping or tubing.

Never fill the reservoir if there is an open flame, lighted cigarette, or other possible source of ignition nearby.

LAMPS.—Keep gasoline lamps clean. Always set a lamp on a table or other solid object, and set it away from the edge. If a lamp leaks or operates improperly, remove it

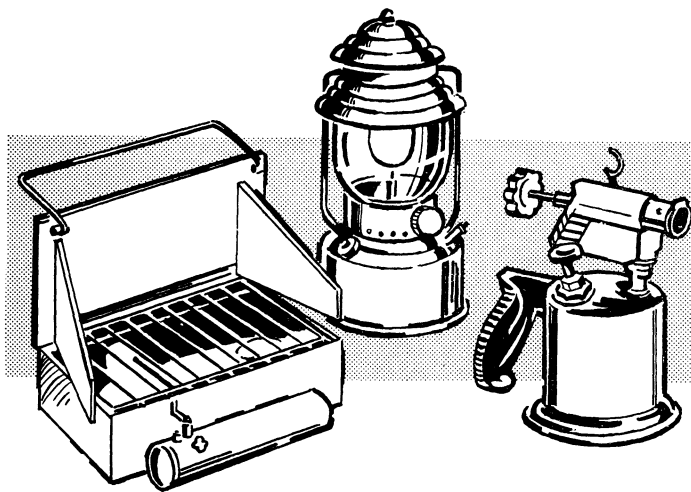
from the building immediately. Refill lamps outdoors.

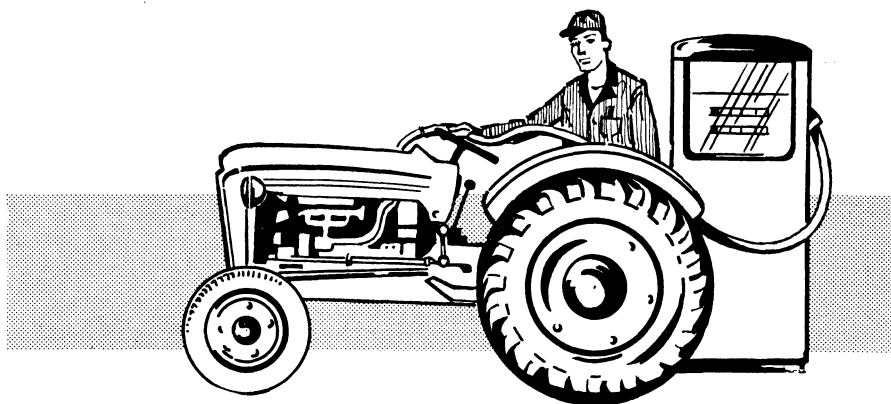
BLOWTORCHES.—Fill gasoline blowtorches outdoors. Do not overfill the priming cup when starting the torch; gasoline may flow over the tank, become ignited, and produce sufficient heat to develop dangerous pressure in the tank. If gasoline flows over the tank, wipe it off thoroughly before you light the torch.

If a torch leaks, or operates improperly, remove it from the building immediately. Never leave a burning blowtorch unattended.

Pouring Gasoline

Never pour gasoline near an open flame, operating engine or motor, or other possible source of ignition. The vapors produced in pouring gasoline from one container to another may form an explosive mixture with the air. An open flame or spark could ignite the mixture and cause an explosion.





A static spark can be created by pouring gasoline from one container to another. The spark could ignite the explosive mixture of vapor and air. To prevent a spark, always maintain metallic contact between containers. For example, if you are refueling a vehicle at a gasoline pump, keep the metal nozzle of the pump hose in contact with the mouth of the gasoline tank. If you use a funnel in pouring gasoline from one container to another, keep both containers in contact with the funnel.

Kerosene Lanterns, Heaters, Incubators, and Brooders

About 95 percent of the farms in the United States are electrified, but kerosene-burning lanterns, heaters, incubators, and brooders are still being used. The following precautions should be observed.

GENERAL.—Never fill the oil reservoir while the burner is lit or when there is an open flame or other possible source of ignition nearby.

Keep wicks and burners clean.

Boil burners in soda, lye, or soap to clean them.

Replace a wick that does not entirely fill the wick-tube section of the burner. A wick that is too narrow permits contact between the flame and the vapor above the oil in the reservoir. This could result in an explosion.

LANTERNS.—Do not use a lantern if it leaks. Always hang a lantern on a substantial hook or place it on a solid support. Make sure it is out of the wind, away from cobwebs or other combustible material, and high enough to be safe from damage or disturbance. Do not hang it above a stove or in other warm places. If the kerosene in the reservoir is heated, it may produce vapors that cause “flaring.”

To extinguish a lantern, first turn the wick down slightly and then blow out the flame from over the top of the burner.

HEATERS.—Never carry a lighted heater or portable stove about the house. Extinguish it before you move it. Set a heater where it will not be hit by swinging doors or by

children at play. Keep combustible material away from it.

To extinguish a heater, first turn the wick down slightly and then blow out the flame from over the top of the burner.

INCUBATORS AND BROODERS.—Operate incubators and brooders in small detached buildings, not in the house or barn. They are usually left burning unattended for long periods, and if a fire should occur, the loss will be minimized if they are in an isolated building.

Starting or Reviving Fires With Kerosene

Never pour kerosene or any other flammable liquid into a stove, furnace, fireplace, or campfire to start or revive the fire. This dangerous practice has resulted in many disastrous fires and explosions that have caused serious and fatal burns.

The stove or furnace may still be warm from the previous fire or it may contain smoldering ashes when you pour in the kerosene. This condition may cause the liquid to heat

to the point where it produces explosive vapors. The danger is greatest when the kerosene is not immediately ignited, but is heated and forms explosive vapors to mix with the air.

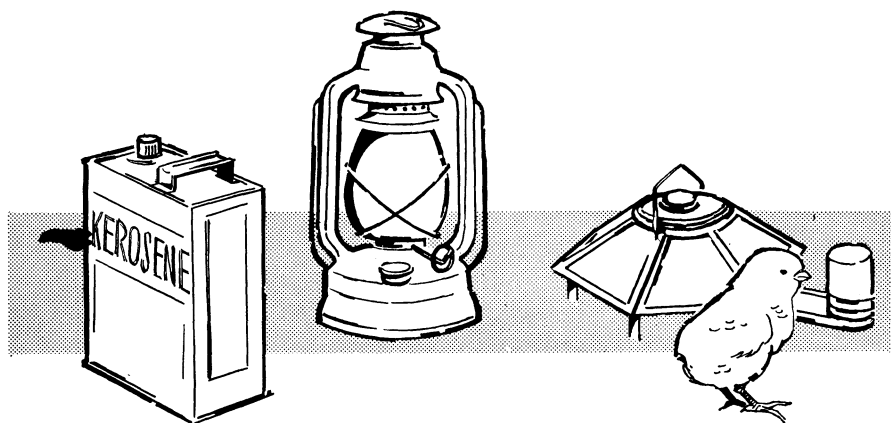
Fuel-Oil Burners

HEATING EQUIPMENT.—Improper use or installation of domestic oil burners can create a fire hazard.

Oil-burning heating systems require the installation of tanks, piping, the burner proper, and, in most cases, electrical wiring. This equipment should be installed by competent workmen and in strict accordance with the manufacturer's instructions and the recommendations of the National Fire Protection Association and the National Electrical Code.

Once the equipment is installed, it should be maintained by experienced personnel. Do not allow inexperienced persons to tamper with the automatic devices that control burner operation.

Oil used in burners should have



a “flash point” of not less than the local legal minimum.

RANGES.—An oil-burning range, or stove, should be substantially constructed. It should be installed in strict accordance with the manufacturer’s instructions.

Place the fuel container (bottle) at a safe distance from the stove. Make sure it is well supported and in a position where it cannot be accidentally hit. Do not set it too high above the range—the oil may flow into the range too fast. Most of the fires that originate in ranges are caused by a too rapid flow of oil.

Do not spill oil on the outside of the bottle when filling it. Oil makes the surface slippery. If you drop the bottle on or near the range, it may ignite.

LP Gas

Liquefied petroleum (LP) gas includes propane, butane, and mixtures of the two. It is commonly

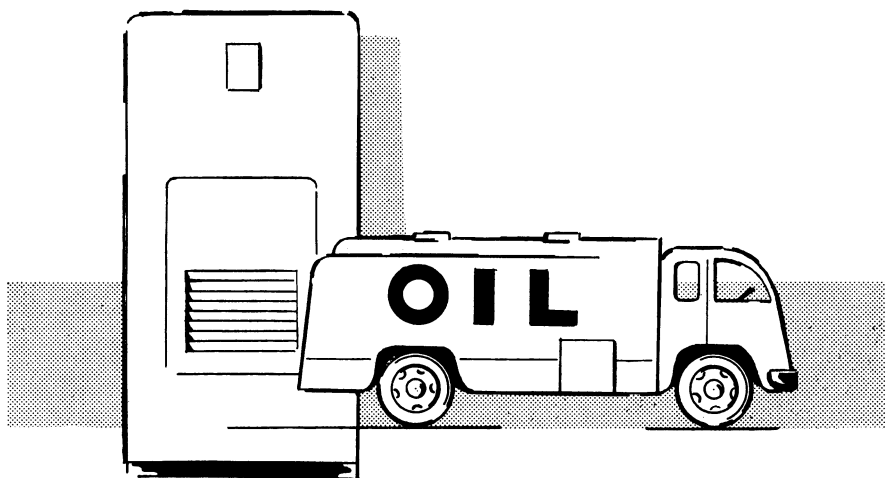
referred to as LP gas, bottled gas, propane, or butane, but is also known by various trade names. It is widely used on farms for cooking, heating water, and heating the house, and as tractor fuel.

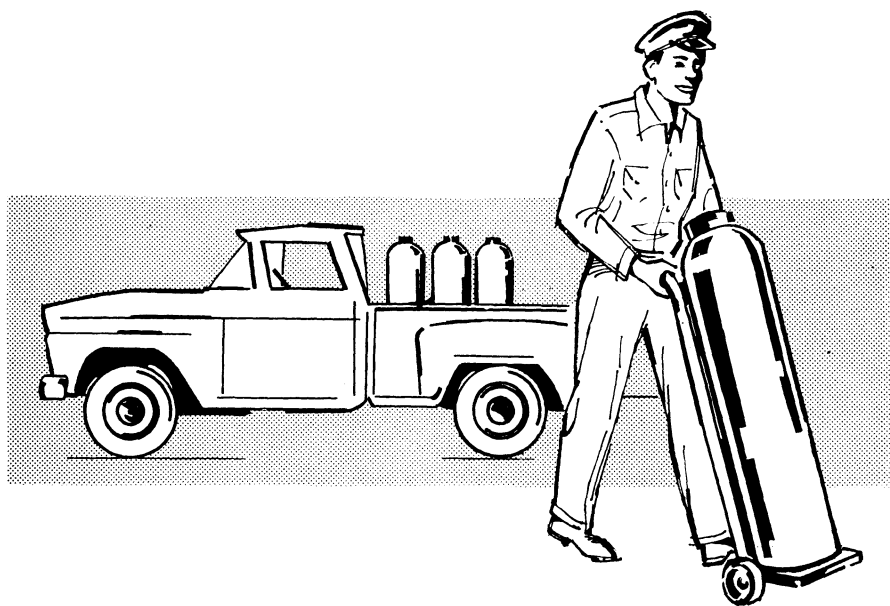
LP gas is supplied to consumers in specially designed cylinders approved by the Interstate Commerce Commission or by tank truck to a bulk storage tank on the consumer’s premises.

It is handled and stored as a liquid under pressure, but is used as a gas. In the gaseous state, it is as dangerous as any other manufactured gas or flammable liquid. The range of combustibility is considerably narrower and lower than that of other gas.

LP gas is heavier than air. If there is a leak in a system, the gas will accumulate in low areas. Good ventilation, therefore, is most important.

All equipment—appliances, piping, cylinders, or tanks—must be installed by trained personnel. Normally, the LP-gas distributor (a





trained serviceman) installs the equipment.

Installation must be in accordance with the standards of the National Fire Protection Association and any State or local regulations. Most States have safety regulations governing the installation of LP-gas systems, which incorporate the standards of the NFPA.

All equipment used must be of approved types. Underwriters' Laboratories, Inc., tests and lists LP-gas equipment. The American Gas Association approves appliances for use with the gas.

The dealer normally fills all cylinders or tanks and makes the necessary connections. However, when the gas is used as engine fuel, the user generally fills the tank on the vehicle. Never completely fill the tank. Leave adequate space for expansion of the fuel with temperature increases. Follow the instruc-

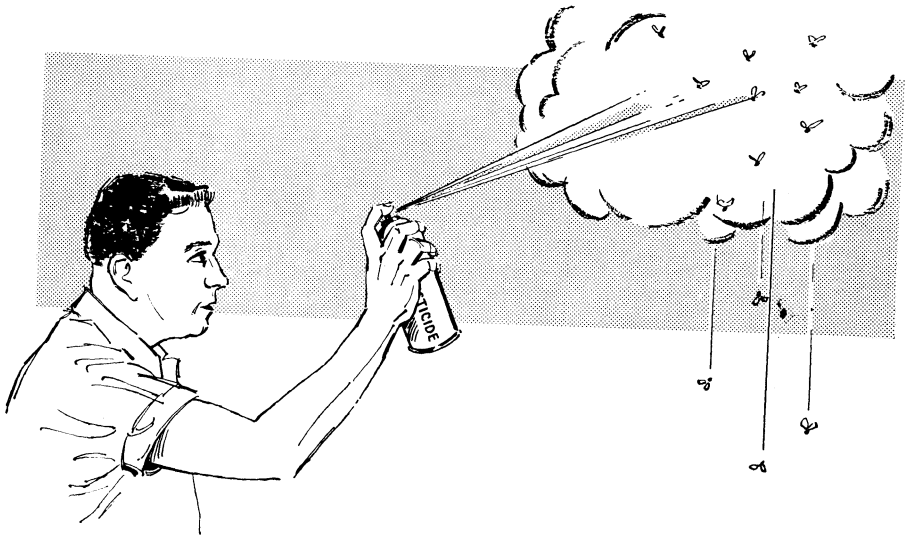
tions on the gaging device on the tank and the recommendations of the LP-gas dealer.

LP gas, as manufactured, is essentially odorless. A distinctive odorant is added to facilitate the detection of leaks. Familiarize yourself with this odor. If you suspect a leak, immediately close the main fuel-supply valve and call a serviceman to make the necessary repairs. *Never use a flame to check for a suspected leak.*

Never use LP gas in such a way that the gas may be released into the air in excessive quantities. For example, do not use it for spray painting, inflating tires, or cleaning.

Spraying Insecticides

Many household insecticides are flammable. Never spray insecticide near an open flame, lighted ciga-



rette, or other possible source of ignition. Before you start spraying, turn off pilot lights and disconnect any electrical equipment that might cause sparks. Keep the insecticide container closed and away from heat.

Paints and Lacquers

QUICK-DRYING PRODUCTS.—Some quick-drying paints and lacquers give off flammable vapors while they are being applied and while they are drying. The degree of danger depends on the quantity of vapors produced.

The quantity of vapors depends on the amount of paint or lacquer used and on the particular product. For example, fewer vapors are produced in painting a chair than in painting a wall, and some relatively quick-drying paints do not produce flammable vapors in large quantities.

To be on the safe side, use any quick-drying paint or lacquer only in a well-ventilated room. Keep open flames, lighted cigarettes, and other possible sources of ignition away from the working area.

HEATING PAINT.—In cold weather, paint may have to be heated before it can be used. Never heat it by setting the can on top of a lighted stove. Set the can in a pan of hot water. Keep the lid partly open.

PAINT RAGS.—Most paints contain linseed oil or other drying oils. The oil tends to heat spontaneously when soaked up in rags or cotton waste. If you leave used rags or cotton waste lying around, a fire could occur. Burn them outdoors or place them in a covered metal can as soon as you have finished painting each day.

PAINT REMOVER.—Most paint removers give off highly flammable

vapors. Some of the vapors are also poisonous. Use paint removers only in a well-ventilated room. Keep open flames, lighted cigarettes, and other possible sources of ignition away from the working area.

STORAGE

Gasoline

UNDERGROUND TANKS.—An underground tank is the best place to store gasoline. A pump similar to the type used in gasoline service stations can be used to draw the gasoline.

The tank, pump, and additional equipment necessary should be of approved types and should be installed in accordance with recognized standards.

No part of the tank should be closer than 1 foot to the nearest wall of any basement or cellar or closer than 3 feet to any property line.

Set the tank on a firm foundation, surrounded with well-tamped soft earth or sand. Cover the tank with a minimum of 2 feet of earth. If you bury the tank under a roadway used by heavy vehicles, cover it with at least 3 feet of earth or with 18 inches of well-tamped earth plus 6 inches of reinforced concrete or 8

inches of asphaltic concrete. When concrete is used, extend the slab at least 1 foot in all directions beyond the outline of the tank.

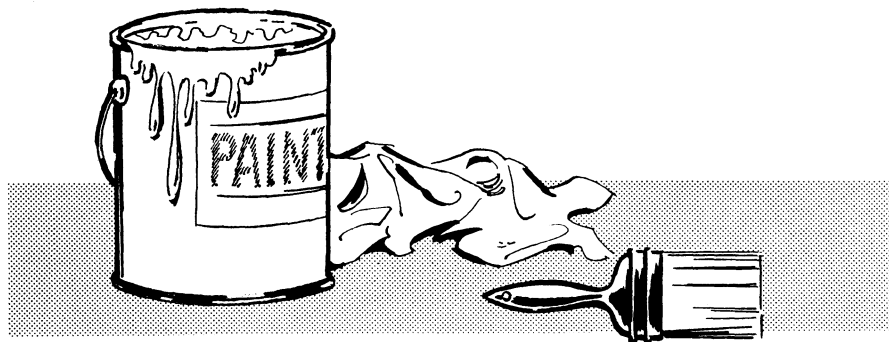
STEEL DRUMS.—Next to underground tanks, substantially constructed steel drums are the best storage containers for gasoline. The drums should be designed for gasoline storage. (Lubricating-oil drums are an example of drums that should not be used for storing gasoline.)

Keep the drums at least 40 feet away from buildings. Build an enclosure around them to protect them against the weather and tampering. Be sure the enclosure is well ventilated so that vapors can escape if a drum leaks or gasoline is spilled.

Paint the word **GASOLINE** on each drum in a conspicuous manner.

ABOVEGROUND TANKS.—Additional precautions are required when gasoline is stored in aboveground tanks.

Locate the tank at least 40 feet from any building. Dig a ditch around it to prevent the flow of gasoline toward buildings if there is a leak.



Tanks with top openings only should be mounted on timbers or blocks approximately 6 inches high to protect the bottom from corroding. Equip tanks with a tightly and permanently attached pumping device that has a hose long enough to permit filling vehicles, equipment, or containers. Either the pump or the hose should be equipped with a padlock to prevent tampering. An effective antisiphoning device should be included in the pump discharge.

Tanks elevated for gravity discharge must have supports of adequate strength and design to provide stability. The opening may be in the bottom or at the end. It should be equipped with an internal safety valve that will close automatically in case of fire and that can also be operated manually. A hose equipped with a self-closing valve at the discharge end should be provided at the tank outlet. The valve should be a type that can be padlocked.

Some types of aboveground gaso-

line storage tanks may require grounding for protection against lightning.

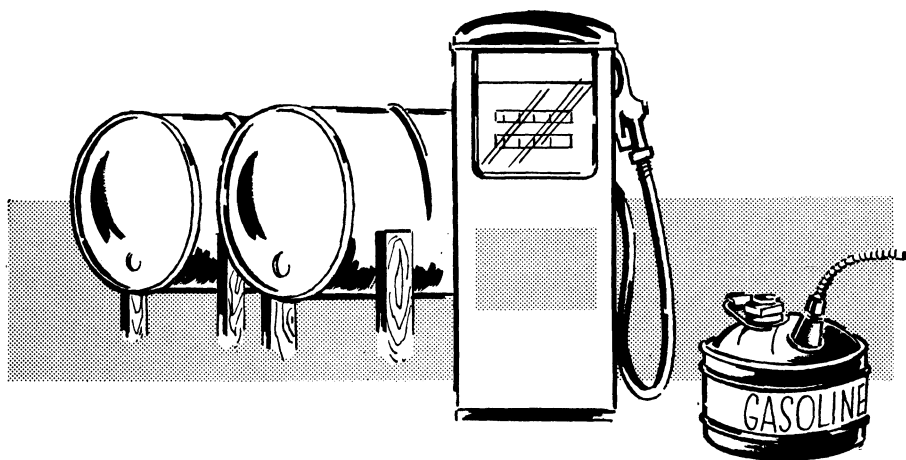
Paint the words **FLAMMABLE—KEEP FIRE AND FLAME AWAY** on aboveground storage tanks.

SAFETY CANS.—Small quantities of gasoline may be stored in safety cans. Approved types of various capacities are available. If it is necessary to carry gasoline into a building, use a safety can of not more than 1-gallon capacity.

DRAWING GASOLINE.—Never draw gasoline from a tank, drum, or other container if there is an open flame or other possible source of ignition nearby.

If it is necessary to draw gasoline at night, be sure you have adequate light to work by. Use an electric flashlight or install incandescent electric lamps. The lamps should be installed in compliance with the National Electrical Code.

Drums and other containers for gasoline should have caps, plugs, or bungs for the outlets. These must



be replaced as soon as the liquid has been drawn.

Kerosene

Store only small quantities of kerosene in buildings. Use closed metal containers. Never store or carry open containers of kerosene in buildings. Keep stored containers of kerosene away from furnaces and other heating appliances. Remove oily rags and other combustible material from the storage area.

Store large quantities of kerosene outside buildings in steel drums or in an underground tank. Use a pump to draw the kerosene.

Paint the word **KEROSENE** on drums, cans, or other containers. Keep the containers clean.

Kerosene for immediate use should be kept in a can that is distinctly painted and that is entirely different in size and shape from the container in which gasoline is stored. This lessens the possibility of using gasoline by mistake, especially at night.

Diesel Fuel

Small quantities of diesel fuel may be stored in buildings in approved containers. Follow the same precautions as when storing kerosene.

LP Gas

Liquefied petroleum (LP) gas is stored in and used from pressure-type cylinders or permanent above-ground or belowground storage tanks.

Both cylinders and tanks must be

installed outside buildings. They should be placed on suitable foundations and located in accordance with the standards of the National Fire Protection Association.

Normally, the LP-gas distributor (a trained serviceman) installs the cylinders or tanks and makes the necessary connections. The consumer provides the foundation, which must meet the distributor's specifications.

EXTINGUISHING SMALL FIRES

Be prepared to take quick effective action against a fire when it breaks out. Keep portable fire extinguishers suitable for use against flammable-liquid fires in a handy place and in condition for instant use. Know how to operate them properly. Familiarize yourself with other methods that can be used to fight fires. If you can put out a fire or at least keep it under control until help arrives, damage can be kept to a minimum.

Flammable-Liquid Fires

FIRE EXTINGUISHERS.—The best way to extinguish a small flammable-liquid fire is to smother it with a foam or fire-extinguishing gas. These types of portable extinguishers can be used: Foam, carbon dioxide, loaded stream, and dry chemical.

For adequate protection, you should have at least one of the following units:

- Two 2½-gallon or one 5-gallon foam extinguisher.

- Four 2-pound, two 5-, 7½-, or 10-pound, or one 15-pound carbon dioxide extinguisher.

- Two 1¾- or 2½-gallon loaded-stream extinguishers.

- One 15- or 20-pound dry-chemical extinguisher.

These extinguishers are all portable and have a relatively short period of effective discharge. Before putting one into operation, be sure you know the location of the seat of the fire and that you are within the prescribed effective range. The chart on page 16 shows the effective range of each type.

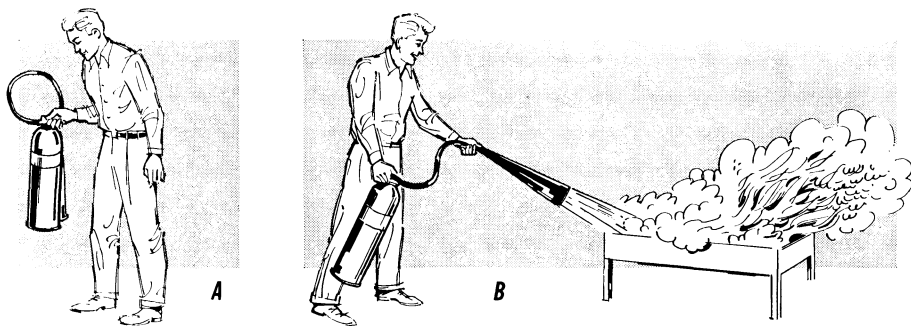
Carbon dioxide extinguishers give off vapors that can cause suffocation. Be careful when using this type of extinguisher, especially in poorly ventilated places such as small rooms or closets.

Use only extinguishers that bear the label of Underwriters' Laboratories, Inc., Factory Mutual Laboratories, or other recognized testing laboratories.

SAND, SODA AND SAWDUST, AND WATER.—Sand can be used to prevent a fire when flammable liquid is spilled. It will absorb the liquid when spread over it. Sand may also be used to put out small isolated fires on floors. It must be put on quickly and heavily enough to smother the fire.

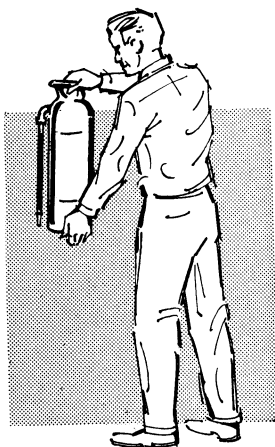
A mixture of sawdust and sodium bicarbonate is effective against small lubricating-oil or grease fires in open containers or on floors. The mixture should be 10 pounds of sodium bicarbonate to 1 bushel of sawdust. It must be applied rapidly and spread over the entire surface.

Water is not effective in fighting flammable-liquid fires when it is applied by hose stream, buckets, or similar methods. In fact, it may spread the burning liquid and make control of the fire more difficult. However, a fine spray of water, such as that delivered by a tree sprayer or a garden hose with a spray nozzle,



HOW TO OPERATE A CARBON DIOXIDE EXTINGUISHER

- A.** Lift the extinguisher off its bracket by the handle and carry it to the fire as shown. **B.** A trigger, lever, or other mechanism starts the discharge. Direct the discharge first at the near edge and bottom of the fire. Then, moving the horn slowly from side to side, direct the discharge forward and upward. Continue the discharge even after the fire has been extinguished; this cools the liquid and prevents possible reflashing.



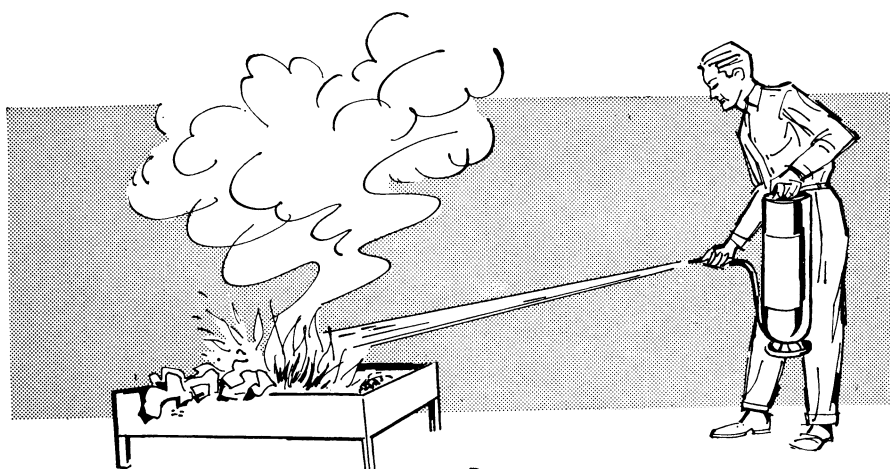
A



B



C



D

HOW TO OPERATE A FOAM EXTINGUISHER

A. Lift extinguisher off hanger. B. Carry extinguisher to the fire. C. At fire, turn extinguisher over. D. Direct the stream against the inside of the opposite wall and above the level of the burning liquid. If possible, walk around the fire while discharging the extinguisher. If the fire is on the floor, stand back from the fire and allow the foam to fall on it without much force. This will prevent the flames from spreading.

often can be used effectively in controlling a flammable-liquid fire.

Water can be used to keep tanks or other containers of flammable

liquids cool when there is a fire around them. This may prevent overpressure of the container and possible rupture.

Portable Extinguishers for Flammable-Liquid Fires

Types and suitable sizes	Maximum effective range	Protect from freezing?	When to recharge
FOAM 2½ and 5 gallons..	30 to 40 feet. (Most effective at a distance, but can be used at close range.)	Yes. (Keep in heated cabinet. Never add anti-freeze chemical.)	After use and annually.
CARBON DIOXIDE 2, 5, 7½, 10, and 15 pounds.	3 to 8 feet. (Best results obtained close to fire.)	No.....	After use. (Weigh annually; if weight loss exceeds 10 percent, recharge.)
LOADED STREAM 1¾ and 2½ gallons..	30 to 40 feet. (Most effective at close range.)	No.....	After use.
DRY CHEMICAL 15 to 25 pounds....	5 to 20 feet	No.....	After use. (Weigh cartridge annually to check for leaks.)

A spray of water can be used to absorb heat and keep the surroundings cool while a flammable-liquid fire that cannot be extinguished is burning itself out.

LP-Gas Fires

In general, LP-gas fires should be extinguished by stopping the flow

of gas. This is done by closing valves. If the flow of gas cannot be stopped, it is usually safer to let the gas burn than to extinguish the flame and allow the gas to accumulate and possibly to re-ignite.

Water may be used to keep LP-gas containers cool when they are exposed to a nearby fire.